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10/726,446	12/03/2003	Stephen F. Smith	UBAT1420	6746

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EXAMINER	
VLAHOS, SOPHIA	

ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/726,446	Applicant(s) SMITH ET AL.	
	Examiner SOPHIA VLAHOS	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/17/2005*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The specification is objected because of the following minor informality: Paragraph [0040] of the patent application publication (2005/0123061) recites: "...The entire contents of U.S. patent application **Ser. No. 10/____** (attorney docket number UBATT1430 also known as..." (emphasis added). The number of the U.S. patent number should be filed out.

Claim Objections

2. Claim13 is objected to because of the following informalities: Claim 13 is objected because it is numbered as claim 12 (it should be claim 13). Appropriate correction is required.

Claims 1-10 are objected because of the following informality: These claims mention a "carrier signal" but this should be revised as a "signal".

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

With respect to claim 1, claim 1 recites "modulating" steps, i.e. transformation of the "carrier signal", and mathematical manipulation (transformation) of a signal without a claimed practical application is non-staturory subject matter.

Dependent claims ~~1~~ 2-7 are also rejected as directed to non-statutory subject matter since they contain at least the limitations of claim 1.

Claim 8, recites a computer program implementing the method of claim 1, and is therefore directed to non-statutory subject matter (computer program that performs the signal (number) mathematical manipulation (modulating steps) of claim 1).

Claim 9 is rejected under the same rational used to reject claim 8.

Similarly claim 11, recites: "demodulating steps" , i.e. transformation of the "carrier signal", and mathematical manipulation (transformation) of a signal without a claimed practical application is non-staturory subject matter.

Dependent claims 12-17 are also rejected as directed to non-statutory subject matter since they contain at least the limitations of claim 11.

Claim 18, recites a computer program implementing the method of claim 1, and is therefore directed to non-statutory subject matter (computer program that per1forms the signal (number) mathematical manipulation (demodulating steps) of claim 11).

Claim 19 is rejected under the same rational used to reject claim 18.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 11 are rejected under 35 U.S.C. 102 (b) as being anticipated by Welti (U.S. 4,084,137).

With respect to claim 1, Welti discloses: modulating a carrier signal in a first domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (see column 6, lines 27-30 (see amplitude modulation)); modulating the carrier signal in a second domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (see column 6, lines 27-30 (polarization(); and modulating the carrier signal in a third domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (again, see column 6, lines 27-30, (phase)).

With respect to claim 11, Welti discloses: demodulating a signal in a first domain selected from the group consisting of phase, frequency, amplitude, polarization and spread (see Fig. 3 receiver/demodulator, signal received from antenna is demodulated in the polarization domain, see column 6, lines 12-26) ; demodulating the signal in a second domain selected from the group consisting of phase, frequency, amplitude, polarization and spread (coherent oscillator, demodulation in phase, column 6, lines 12-26); and demodulating the signal in a third domain selected from the group consisting of phase, frequency, amplitude, polarization and spread (Fig. 3 low-pass filters, amplitude (analog voltage levels) column 6, lines 12-26).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 2, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welti (U.S. 4,084,137) in view of Biglieri (Digital Modulation Techniques, 2002).

With respect to claim 2, all of the limitations of claim 2, are analyzed above in claim 1, but Welti does not expressly teach: wherein modulating the carrier signal in the first domain, modulating the carrier signal in the second domain and modulating the carrier signal in the third domain defines a three dimensional orthogonal symbol constellation selected from the group consisting of face-centered cubic spheres and hexagonal close-packed spheres, each sphere having 12 nearest neighbors.

In the same field of endeavor, Biglieri discloses: wherein modulating the carrier signal in the first domain, modulating the carrier signal in the second domain and modulating the carrier signal in the third domain defines a three dimensional orthogonal symbol constellation (see section 20.6, where the multidimensional modulation (i.e modulation of a signal (carrier) in the first, second, and third domain) forms a lattice) selected from the group consisting of face-centered cubic spheres and hexagonal close-packed spheres, each sphere having 12 nearest neighbors (see Examples of Lattices,

the closest packed cubic lattice with the minimum distance and the kissing number (ie. number of closest neighbors is given by v=2N).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti so that modulating the carrier signal in the first domain, modulating the carrier signal in the second domain and modulating the carrier signal in the third domain defines a three dimensional orthogonal symbol constellation selected from the group consisting of face-centered cubic spheres and hexagonal close-packed spheres, each sphere having 12 nearest neighbors, as a matter of design (coding) choice, depending on the required coding gain, number and proximity of the neighbors (this relates to capacity, since packing more neighbors increases capacity but at a receiver decoding closely packed lattices results into errors).

With respect to claim 12, all of the limitations of claim 12, are analyzed above in claim 11, except for: wherein demodulating the signal in the first domain, demodulating the signal in the second domain and demodulating the signal in the third domain decodes a three dimensional orthogonal symbol constellation selected from the group consisting of face-centered cubic spheres and hexagonal close-packed spheres, each sphere having 12 nearest neighbors.

In the same field of endeavor, Biglieri discloses: wherein demodulating the signal in the first domain, demodulating the signal in the second domain and demodulating the signal in the third domain decodes a three dimensional orthogonal symbol constellation selected from the group consisting of face-centered cubic spheres and hexagonal close-

packed spheres, each sphere having 12 nearest neighbors (see section 20.6 Multidimensional modulations, where modulation is described but it is understood that demodulation corresponds to an inverse of the modulation process).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti, so that demodulating the signal in the first domain, demodulating the signal in the second domain and demodulating the signal in the third domain decodes a three dimensional orthogonal symbol constellation selected from the group consisting of face-centered cubic spheres and hexagonal close-packed spheres, each sphere having 12 nearest neighbors (i.e the above is the result of demodulating a received modulated multi-dimensional constellation, that used the face-centered cubic spheres or hexagonal close-packed spheres, each sphere having 12 nearest neighbors). The motivation for modifying the teachings of Welti, for a person skilled in the art at the time of the invention, is a matter of design choice (i.e the choice of lattice structure used to represent the multi-dimensional modulations, also determines the corresponding demodulating/decoding function at the receiver) and it depends on the required coding gain, number and proximity of the neighbors (i.e. packing more neighbors increases capacity but at a receiver decoding closely packed lattices results into errors).

8. Claim 3-4, 6, 13-14, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welti (U.S. 4,084,137) in view of Shattil (U.S. 6,686,879).

With respect to claim 3, all of the limitations of claim 3 are analyzed above in claim 1, except for: wherein modulating the carrier signal in the first domain includes phase modulation, modulating the carrier signal in the second domain includes amplitude modulation and modulating the carrier signal in the third domain includes spread modulation.

In the same field of endeavor, Shattil discloses: wherein modulating the carrier signal in the first domain includes phase modulation, modulating the carrier signal in the second domain includes amplitude modulation and modulating the carrier signal in the third domain includes spread modulation (see column 11, lines 65-67 and column 1-6 description of carrier signal, and see column 14, lines 32-43, and the coded baseband signal and see combinations of signal modulations, and coded refers to spreading code (for example) column 11, line 7-13).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti so that modulating the carrier signal in the first domain includes phase modulation, modulating the carrier signal in the second domain includes amplitude modulation and modulating the carrier signal in the third domain includes spread modulation as taught by Shattil to enhance bandwidth efficiency and reduce complexity of transmitters and receivers (Shattil, column 1, see section "field of the invention").

With respect to claim 4, all of the limitations of claim 4 are analyzed above in claim 1, except for: further comprising modulating the carrier signal in a fourth domain

selected from the group consisting of phase, frequency, amplitude, polarization, and spread.

In the same field of endeavor, Shattil teaches: further comprising modulating the carrier signal in a fourth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (column 14, lines 35-43).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti to: further modulate the carrier signal in a fourth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread, to enhance bandwidth efficiency and reduce complexity of transmitters and receivers (Shattil, column 1, see section "field of the invention").

With respect to claim 6, all of the limitations of claim 6 are analyzed above in claim 4, except for: further comprising modulating the carrier signal in a fifth domain selected from the group consisting of phase, frequency, amplitude, polarization and spread.

In the same field of endeavor, Shattil teaches: further comprising modulating the carrier signal in a fifth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (see column 14, lines 35-43).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti to: further modulate the carrier signal in a fifth domain selected from the group consisting of phase, frequency, amplitude, polarization,

and spread, to enhance bandwidth efficiency and reduce complexity of transmitters and receivers (Shattil, column 1, see section "field of the invention").

With respect to claim 13, all of the limitations of claim 13, are analyzed above in claim 11, except for: further comprising demodulating the signal in a fourth domain selected from the group consisting of phase, frequency, amplitude, polarization and spread.

In the same field of endeavor, Shattil discloses: wherein demodulating the carrier signal in the first domain includes phase modulation, demodulating the carrier signal in the second domain includes amplitude modulation and demodulating the carrier signal in the third domain includes spread modulation (see column 12, lines 59-67, column 13, lines 1-2, describing demodulation, and see column 14, lines 32-43, for the modulated signal , where demodulation performs the opposite process performed at the modulator, therefore the "...any combination of filtering, envelope detection, sampling, under sampling, time-offset sampling, frequency-offset sampling...etc" are performed so that phase modulation, amplitude modulation, frequency modulation...etc, is/are undone).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti so that demodulating the carrier signal in the first domain includes phase demodulation, demodulating the carrier signal in the second domain includes amplitude demodulation and demodulating the carrier signal in the third domain includes spread demodulation as taught by Shattil to enhance bandwidth efficiency and reduce complexity of transmitters and receivers (Shattil, column 1, see

section "field of the invention" where it is understood that demodulating in the above domains is associated with a modulation in the corresponding domains at the transmitter).

With respect to claim 14, all of the limitations of claim 14 are analyzed above in claim 11, except for: further comprising demodulating the signal in a fourth domain selected from the group consisting of phase, frequency, amplitude, polarization and spread.

In the same field of endeavor, Shattil teaches: further comprising demodulating the carrier signal in a fourth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (see column 12, line 63-67, column 13, lines 1-2, demodulation corresponding to the modulation column 14, lines 35-43).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti to: further demodulate the carrier signal in a fourth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread, to enhance bandwidth efficiency and reduce complexity of transmitters and receivers (Shattil, column 1, see section "field of the invention" where it is understood that the further demodulation step is associated with a corresponding further modulation step at the transmitter).

With respect to claim 16, all of the limitations of claim 16, are analyzed above in claim 14, except for: further comprising demodulating the signal in a fourth domain

selected from the group consisting of phase, frequency, amplitude, polarization and spread.

In the same field of endeavor, Shattil teaches: further comprising demodulating the carrier signal in a fifth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread (see column 14, lines 35-43 and column 12, lines 63-67, column 13, lines 1-2 where the demodulation (using the processing listed in column 12 and 13) corresponds to the modulation described on column 14).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti to: further demodulate the carrier signal in a fifth domain selected from the group consisting of phase, frequency, amplitude, polarization, and spread, to enhance bandwidth efficiency and reduce complexity of transmitters and receivers (Shattil, column 1, see section "field of the invention", where it is understood that the further demodulation step is associated with a corresponding further modulation step at the transmitter).

9. Claims 5, 7, 15, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welti (U.S. 4,084,137) in view of Biglieri (Digital Modulation Techniques, 2002).

With respect to claim 5, all of the limitations of claim 5 are analyzed above in claim 4, except for: wherein modulating the carrier signal in the first domain, modulating the carrier signal in the second domain, modulating the carrier signal in the third domain, and modulating the carrier signal in the fourth domain defines a four-

dimensional orthogonal symbol constellation of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors.

In the same field of endeavor Biglieri discloses, wherein modulating the carrier signal in the first domain, modulating the carrier signal in the second domain, modulating the carrier signal in the third domain, and modulating the carrier signal in the fourth domain defines a four-dimensional orthogonal symbol constellation (see section 20.6 Multi-dimensional Modulations. i.e modulations in the plurality of domains result into a multi-dimensional constellation represented in a lattice)

With respect to the limitation: a four-dimensional orthogonal symbol constellation of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors, although Biglieri does not expressly teach the specific constellation, based on the teachings of Biglieri (see for example Table 20.1 listing coding gains of other constellation/lattice structures), it would have been obvious to a person skilled in the art to modify the teachings of Welti, so that the a four-dimensional orthogonal symbol constellation (is a constellation) of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors, as a matter of design choice, i.e. depending on the required coding gain and capacity.

With respect to claim 7, all of the limitations of claim 7 are analyzed above in claim 6, except for: wherein modulating the carrier signal in the first domain, modulating the carrier signal in the second domain, modulating the carrier signal in the third domain, modulating the carrier signal in the fourth domain and modulating the carrier

signal in the fifth domain defines a five-dimensional orthogonal symbol constellation of hyperspheres, each hypersphere having 48 nearest neighbors.

In the same field of endeavor, Biglieri discloses, wherein modulating the carrier signal in the first domain, modulating the carrier signal in the second domain, modulating the carrier signal in the third domain, and modulating the carrier signal in the fourth domain and modulating the carrier signal in the fifth domain defines a five-dimensional orthogonal symbol constellation (see section 20.6 Multi-dimensional Modulations. i.e modulations in the plurality of domains result into a multi-dimensional constellation represented in a lattice)

With respect to the limitation: a five-dimensional orthogonal symbol constellation of hyperspheres, each hypersphere having 48 nearest neighbors, although Biglieri does not expressly teach the specific constellation, based on the teachings of Biglieri (see for example Table 20.1 listing coding gains of other constellation/lattice structures), it would have been obvious to a person skilled in the art to modify the teachings of Welti, so that the a four-dimensional orthogonal symbol constellation (is a constellation) of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors, as a matter of design choice, i.e. depending on the required coding gain and capacity.

With respect to claim 15, all of the limitations of claim 15 are analyzed above in claim 14, except for: wherein demodulating the signal in the first domain, demodulating the signal in the second domain, demodulating the signal in the third domain and demodulating the signal in the fourth domain decodes a four-dimensional orthogonal

symbol constellation of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors.

In the same field of endeavor, Biglieri discloses: wherein demodulating the signal in the first domain, demodulating the signal in the second domain, demodulating the signal in the third domain and demodulating the signal in the fourth domain decodes a four-dimensional orthogonal symbol constellation (see section 20.6 multidimensional modulations, where it is understood that multi-dimensional modulation corresponds to demodulating a corresponding multi-dimensional symbol constellation);

With respect to the limitation a four-dimensional orthogonal symbol constellation of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors, although Biglieri does not expressly teach the specific constellation, based on the teachings of Biglieri (see for example Table 20.1 listing coding gains of other constellation/lattice structures), it would have been obvious to a person skilled in the art to modify the teachings of Welti, so that the a four-dimensional orthogonal symbol constellation ((constellation to be decoded) is a constellation) of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors, as a matter of design choice, i.e. depending on the required coding gain and capacity (since decoding the specific constellation depends on the constellation transmitted at the transmitter that was selected based on system and component requirements/limitations such as coding gain and capacity).

With respect to claim 17, all of the limitations of claim 17 are analyzed above in claim 16, except for: wherein demodulating the signal in the first domain, demodulating the signal in the second domain, demodulating the signal in the third domain, demodulating the signal in the fourth domain and demodulating the signal in the fifth domain decodes a five-dimensional orthogonal symbol constellation of hyperspheres, each hypersphere having 48 nearest neighbors.

In the same filed of endeavor, Biglieri discloses, wherein demodulating the carrier signal in the first domain, demodulating the carrier signal in the second domain, demodulating the carrier signal in the third domain, and demodulating the carrier signal in the fourth domain and demodulating the carrier signal in the fifth domain decodes a five-dimensional orthogonal symbol constellation (see section 20.6 Multi-dimensional Modulations. i.e modulations in the plurality of domains result into a multi-dimensional constellation represented in a lattice and where it is understood that multi-dimensional modulation corresponds to demodulating a corresponding multi-dimensional symbol constellation)

With respect to the limitation: a five-dimensional orthogonal symbol constellation of hyperspheres, each hypersphere having 48 nearest neighbors, although Biglieri does not expressly teach the specific constellation, based on the teachings of Biglieri (see for example Table 20.1 listing coding gains of other constellation/lattice structures), it would have been obvious to a person skilled in the art to modify the teachings of Welti, so that the a four-dimensional orthogonal symbol constellation of face-centered cubic hyperspheres, each hypersphere having 24 nearest neighbors, is decoded, and this is a

matter of design choice, i.e. depending on the required coding gain and capacity (since decoding the specific constellation depends on the constellation transmitted at the transmitter that was selected based on system and component requirements/limitations such as coding gain and capacity).

10. Claims 8, 9, 18, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welti (U.S. 4,084,137).

With respect to claim 8, all of the limitations of claim 8 are analyzed above in claim 1, except for: a computer program, comprising computer or machine readable program elements translatable for implementing the method of claim 1.

At the time of the invention, it would have been obvious to a person skilled in the art to implement the method of claim 1, using a computer program, comprising computer or machine readable program elements (translatable for implementing the method of Welti), since computer programs are well known in the art and allow a user to perform complicated calculations (process data) at high speeds.

With respect to claim 9, all of the limitations of claim 9 are analyzed above in claim 1, except for: An electronic media, comprising a program for performing the method of claim 1.

At the time of the invention, it would have been obvious to a person skilled in the art to implement the method of claim 1, using an electronic media, comprising a program for performing the method of Welti, since electronic media comprising

programs are known in the art and are used to perform complicated calculations (process data) at high speeds.

With respect to claims 18, and 19 the basis limitations of these claims (claim 11) are disclosed above, and claims 18 and 19 are rejected under a rationale similar to the one used to reject claims 8 and 9 above.

11. Claims 10, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welti (U.S. 4,084,137) in view of Klymyshyn et. al. (U.S. 5,825,257).

With respect to claim 10, all of the limitations of claim 10 are analyzed above in claim 1, except for: wherein modulating the carrier signal in the third domain includes a constant envelope technique.

In the same field of endeavor, Klymyshyn et. al. disclose: modulating the carrier signal includes a constant envelope technique (see column 1, lines 11-14, GMSK modulation of a (carrier) signal).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti (based on the teachings of Klymyshyn et. al) so that modulating the carrier signal in the third domain includes a constant envelope technique (GMSK technique – a constant envelope continuous phase modulation technique). The motivation for performing such a modification is that GMSK is a spectrally efficient modulation method (Klymyshyn et. al column 1,lines 11-12).

With respect to claim 20, all of the limitations of claim 20 are analyzed above in claim 11, except for: wherein demodulating the signal in the third domain includes a constant envelope technique.

In the same field of endeavor, Klymyshyn et. al. disclose: demodulating the carrier signal includes a constant envelope technique (see column 1, lines 11-14, see GMSK modulation of a (carrier) signal, where the GMSK modulation has a corresponding constant envelope demodulation technique).

At the time of the invention, it would have been obvious to a person skilled in the art to modify the teachings of Welti (based on the teachings of Klymyshyn et. al) so that demodulating the carrier signal in the third domain includes a constant envelope technique (GMSK technique – a constant envelope continuous phase modulation technique). The motivation for performing such a modification is that GMSK is a spectrally efficient modulation (and demodulation) method (Klymyshyn et. al column 1,lines 11-12).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is 571 272 5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SV
2/13/2007

M. G.
MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER